

In the Claims

Rewrite claims 4, 8-10, 12, 16-18, 21-24, 27, 30-53, and 58-62 as follows:

A1 4. A radar antenna assembly as claimed in Claim 2, wherein said focussing means includes at least one dielectric lens element located at said second end.

A2 8. A radar antenna assembly as claimed in Claim 1, wherein said tubular casing has an inner diameter D_T of which is an integer multiple of the diameter D_A of said at least one antenna element.

A2 9. A radar antenna assembly as claimed in Claim 1, wherein said tubular casing has an interior length L_T which is an integer multiple of the length L_A of said at least one antenna element.

10. A radar antenna assembly as claimed in Claim 1, wherein an interior surface of said tubular casing comprises an antenna cathode and said elongate antenna element comprises an antenna anode.

A3 12. A radar antenna assembly as claimed in Claim 1, including at least two elongate antenna elements, at least one of which comprises an antenna cathode and at least one of which comprises an antenna anode.

A4 16. A radar antenna assembly as claimed in Claim 1, wherein said dielectric material is a liquid.

A4 17. A radar antenna assembly as claimed in Claim 1, wherein said dielectric material is a solid.

18. A radar antenna assembly as claimed in Claim 1, wherein said dielectric material is a powdered solid packed into the interior of said tubular casing.

A5 21. A radar antenna apparatus as claimed in Claim 19, wherein the base of said pyramidal structure is closed by a generally planar base wall, said chamber comprising the interior volume of said pyramidal structure.

22. A radar antenna assembly as claimed in Claim 19, wherein said chamber comprises a closed volume communicating with the open base of said pyramidal structure.

23. A radar system comprising pulsed signal generating means, transmitter antenna means, receiver antenna means, control means for controlling the operation of said pulsed signal generating

means, analog-digital converter means for digitising signals received by said receiver antenna means, and data storage means for storing said digitised signals, wherein said transmitter antenna means and receiver antenna means comprise at least one radar antenna including one of:

(i) a tubular casing having a radar-reflective inner surface and having a first end, a second end and a longitudinal axis;

a radar-reflective reflector closing said first end;

an aperture disposed at said second end;

at least one elongate antenna element extending substantially parallel to said longitudinal axis from said reflector towards said second end; and

dielectric material substantially filling the interior volume of said tubular casing; or

(ii) a closed chamber adapted to contain a sample of material, said chamber including four substantially triangular side walls together defining an open-based pyramidal structure, said assembly including transmitter antenna elements disposed on interior surfaces of a first opposed pair of said triangular side walls and receiver antenna elements disposed on interior surfaces of a second opposed pair of said triangular side walls.

24. A radar system as claimed in Claim 23, wherein said transmitter antenna means comprises at least one transmitter radar antenna assembly and said receiver antenna means comprises at least one receiver radar antenna said transmitter antenna assembly and said receiver transmitter assembly each comprising:

a tubular casing having a radar-reflective inner surface and having a first end, a second end and a longitudinal axis;

a radar-reflective reflector closing said first end;

an aperture disposed at said second end;

at least one elongate antenna element extending substantially parallel to said longitudinal axis from said reflector towards said second end; and dielectric material substantially filling the interior volume of said tubular casing.

27. A radar system as claimed in Claim 24, wherein said transmitter and receiver antenna assemblies are connected to a closed sample chamber adapted to enclose a subject.

30. A radar system as claimed in Claim 28, wherein said system is adapted to be portable.

31. A radar system as claimed in Claim 28, wherein said system is adapted to be carried by a land vehicle.

32. A radar system as claimed in Claim 28, wherein said system is adapted to be carried by a water-borne vessel.
33. A radar system as claimed in Claim 28, wherein said system is adapted to be carried by a submersible vehicle.
34. A radar system as claimed in Claim 28, wherein said system is adapted to be carried by an airborne vehicle.
35. A radar system as claimed in Claim 28, wherein said system is adapted to be carried by a space vehicle.
36. A radar system as claimed in Claim 28, wherein the position of said transmitter antenna assembly is fixed relative to said receiver antenna assembly.
37. A radar system as claimed in Claim 28, wherein at least one of said transmitter antenna assembly and said second antenna assembly is adapted to be movable relative to a subject.
38. A radar system as claimed in Claim 28 in which one of said transmitter and receiver antenna assemblies is adapted to be movable relative to the other.
39. A radar system as claimed in Claim 28, including a plurality of transmitter antenna assemblies.
40. A radar system as claimed in Claim 28, including a plurality of receiver antenna assemblies.
41. A radar system as claimed in Claim 28, for use with close range subjects, in which said control means is adapted to control said pulsed signal generating means so as to generate pulses with a pulse repetition frequency of the order of 100 kHz.
42. A radar system as claimed in Claim 28, for use with close range subjects, in which said control means is adapted to control said pulsed signal generating means so as to generate pulses with a pulse width in the range 0.01 to 0.1 nanoseconds.
43. A radar system as claimed in Claim 28, for use with close range subjects, adapted to capture data in a time range of 2 to 25 nanoseconds.

44. A radar system as claimed in Claim 28, for use with close range subjects, adapted to transmit pulses with a minimum frequency in the range 100 to 1000 MHz and with a maximum frequency in the range 1000 to 10000 MHz.

45. A radar system as claimed in Claim 28, for use with close to medium range subjects, in which said control means is adapted to control said pulsed signal generating means so as to generate pulses with a pulse repetition frequency of the order of 25 to 100 kHz.

46. A radar system as claimed in Claim 28, for use with close to medium range subjects, in which said control means is adapted to control said pulsed signal generating means so as to generate pulses with a pulse width in the range 1 to 10 nanoseconds.

47. A radar system as claimed in Claim 28, for use with close to medium range subjects, adapted to capture data in a time range of 2000 to 10000 nanoseconds.

48. A radar system as claimed in Claim 28, for use with close to medium range subjects, adapted to transmit pulses with a minimum frequency in the range 12.5 to 125 MHz and with a maximum frequency in the range 200 to 2000 MHz.

49. A radar system as claimed in Claim 28, for use with long range subjects, in which said control means is adapted to control said pulsed signal generating means so as to generate pulses with a pulse repetition frequency of the order of 3.125 to 50 kHz.

50. A radar system as claimed in Claim 28, for use with long range subjects, in which said control means is adapted to control said pulsed signal generating means so as to generate pulses with a pulse width in the range 10 to 25 nanoseconds.

51. A radar system as claimed in Claim 28, for use with long range subjects, adapted to capture data in a time range of 20000 to 250000 nanoseconds.

52. A radar system as claimed in Claim 28, for use with long range subjects, adapted to transmit pulses with a minimum frequency in the range 1 to 12.5 MHz and with a maximum frequency in the range 12.5 to 200 MHz.

53. A radar system as claimed in Claim 28, further including data processing means for processing said digitised signals.

58. A method as claimed in Claim 55, wherein said step of analysing said energy-frequency spectrum comprises frequency classification using energy bins.

59. A method as claimed in Claim 55, wherein said step of analysing said energy-frequency spectrum comprises energy classification using frequency bins.

AS 60. A method of identifying an unknown subject comprising the steps of:
obtaining an energy-frequency signature of said subject using the method of Claim 55; and
comparing said energy-frequency signature of the unknown subject to a database of energy-frequency signatures of known subjects previously obtained using the method of Claim 55.

61. A method as claimed in Claim 55, implemented using a radar system as claimed in Claim 53.

62. A radar system as claimed in Claim 53, wherein said data processing means is adapted to perform the method of Claim 55.